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quent barrenness of the rocks would be incomprehensible. And had coral animals and large plants capable of producing such masses of limestone and graphite existed so early, the absence of any fossils earlier than the Cambrian would be inexplicable. It is acknowledged, however, that such formations might have been produced by inorganic agencies, and the facts strongly indicate that such was their origin, and that fossils began to be preserved very shortly after the power in animals to secrete hard skeletons appeared.

BIRDS OF NEW GUINEA (FLY CATCHERS AND OTHERS).

BY G. S. MEAD.

(Continued from page 195.)

The Thickheads (*Pachycephala*) are of many species and scattered widely over the Archipelago. Many have come under trained observation only during recent years. Probably many more await discovery.

Pachycephalopsis poliosoma, Gray Thickhead, was discovered by Mr. A. Goldie in Southeastern New Guinea, and owing to its distinctive coloration was classed as a new genus. It is really one of a group of birds which might form a subgenus and is accordingly so divided by Mr. Gadow. Above the general color is dark gray, almost brown, with the head still darker. The square, rather short tail is also dull of hue. Beneath is dull gray, lighter on the abdomen and tail coverts, whitish to white on the jugulum, throat, chin and side face. It is a pretty, soft colored little bird about 6 inches long, sufficiently numerous among the mountains of the Astrolabe range to be called common.

Pachycephala melanura ranges widely over Northern Australia and the Archipelago. The general color above is olive-green; wing coverts, tail, head and an irregular band passing

over the head, neck and breast, black and glossy black. The under parts, with a broken collar about the neck, are a warm light yellow. Throat a pure white. Whitish lines the under side of the wings and tail. Bill and feet black. The female lacks the vivid coloring of the male, being brownish where he is a jet black, buff or whitish where he is a bright gold. Length 7 inches.

Very like the above, but of reduced size, is *Pachycephala schlegelii*, whose total length is under 5.5 inches. The differences lie in the greater width of black band across the breast, in the line of black edging the wings, and the orange rufous on the abdomen. The female resembles the female of *Pachycephala soror*, found also among the Arfak Mountains. This bird is olivebrown above, wings and head darker. The under surface is a bright yellow, omitting the grayish wings and dull thighs. Like her mate, the throat and chin are white. The male *P. soror* is unmarked by the yellow nuchal collar but is not without the black crescent. A bright yellow covers the breast and abdomen. The head is black, the tail dusky. Total length about 6 inches.

There are several other species of *Pachycephala* resident in Papua, almost all bearing a greater or less resemblance to each other. Among these may be mentioned without detailed description, *P. hyperythra* from Southeastern New Guinea whose under parts are of the warm reddish color that gives it its specific name.

P. albispectularis, from the Arfak region, is another species—a somewhat larger bird than its kind, gray and dark brown in general coloring with white markings on the wings.

Still another is *P. griseiceps* or *virescens*, with local differences, a bird of the average length, somewhat diversified plumage and a mottled head.

Smaller than the foregoing but with throat and chest crescent more distinctly outlined, is *P. leucogaster*, collected in the Motu country. *P. leucostigma*, from the northeast, is considerably mottled, with much rufous on the under parts, the usual white in this instance somewhat discolored, on the throat, and much streaked on the mantle.

Pachycephala fortis has its habitat in the Astrolabe Mountains, though found probably elsewhere in New Guinea. Its total length is nearly 7 inches, colored almost entirely above dark olive, below ashy gray. The head and mantle are dark gray, the tail dusky, the back and wings greenish olive. On the face are gray shadings. White prevails on the abdomen, passing into yellow. The under wings do not differ from the uniform cloudiness but are, if anything, even duller than the body.

Pachycare flavogrisea, set apart from *Pachycephala*, is colored a bluegray above, somewhat varied on the tail and wings by black or white edgings, while the under parts are a "deep, shining yellow, the yellow on the forehead and the sides of the head and neck being separated from the bluegray of the head by a broad dark stripe." Total length 4.5 inches.

If we look for those attractive little birds—the Titmice—in New Guinea, we shall find very few, if any, specimens. One is mentioned in the books, viz., *Xerophila leucopsis*, an Australian species, abundant in Queensland but not so numerous in Southern Papua. The little bird in question has a length of 4 inches. Its general color is brown, ashy above, whitish and yellowish beneath. Along the tail, neck and head the brown is positive; this is true also of the under wings; elsewhere, however, the colors are pale and indistinct, shading off gradually, as on the sides and breast, into a clouded white.

Several species and subspecies of the genus *Cracticus* range between Australia and New Guinea. These are Lanidine birds of good size, strong of beak, black, white or gray of color.

Cracticus quoyi, a typical representative, is one of these distributed pretty generally over North Australia and Southern Papua. It is almost entirely black and blueblack, the only variation being in the shading and lustre. The length is about 14 inches. Sexes alike.

Cracticus cassicus or *personatus* is more peculiarly insular, being confined chiefly to New Guinea and its islands.

The bird is strikingly conspicuous in its contrasted black and white. The former color covers the head and neck, throat and chest, upper wings and tail, excepting the two

middle feathers which are partially white. There are scattered markings, moreover, of black, intermingled with white on the back and wings. All else is a pure white above and beneath. The female is perhaps not of such glossy plumage and has less white on the back. She is also smaller than her mate by half an inch. Total length 13 inches.

Another species from Southeastern New Guinea, collected by Mr. Stone and others, is called *Cracticus mentalis* or *spaldingii*. This Dr. E. P. Ramsay of the Sydney Museum believes to be identical with *C. crassirostris*, a species separated by Count Salvadori from *C. quoyi*, already described, though by some regarded as one and the same. *C. mentalis* is about 10 inches long. The white is banded so as to divide the black of neck and back. Chin black.

In addition to those not very happily named birds—*Eupetes*—already mentioned in a previous article, two or three species may be briefly described.

Eupetes incertus is colored above a warm ruddy brown, the tail not quite so bright. White, bordered by dusky covers the throat, side face and abdomen. Over the chest and along the side body the plumage is rufous, the under tail coverts buff. Bill and feet are dark. Total length about 7 inches. The mountains of the northwest are the home of this species, as also of *Eupetes leucostictus* whose breast is flecked with white as its name indicates. This *Eupetes* is boldly colored with its chestnutbrown head and mantle, and its glossed dark green body and black wings spotted white on the coverts. Instead, however, of the usual white throat, the throat is black, although there is much white on either side. Black marks, too, lie on the face near the eye, the chin and upper breast. The lower parts are gray with a bluish tinge. The tail is black, the exterior feathers tipped with white, the middle ones oily green. The bill, feet and eye are black. Altogether this specimen is a remarkably fine one, unlike, in many respects, most of its family.

Eupetes pulcher, discovered in the Astrolabe Mountains, by Mr. Goldie, may be briefly described as differing from *E. castanotus* (AMER. NAT., No. 343, p. 634) only in having the head

a decidedly dusky shade instead of chestnut, and a narrow black edging to the throat in place of a somewhat broad band of black. Length 9 inches. Female a trifle smaller.

Eupetes ajax (Temm.) or *Cinclosoma ajax*, as Dr. Sharpe prefers to call it, classing it as distinct from the *Eupetes*, is a thrushlike bird about the same size as the foregoing. The general color above is a dull brown, becoming darker near and upon the tail and wings. The wing coverts, however, are a shining black; the same is true of the exterior tail feathers, excepting their ends. About the head also there is considerable glossy black which runs down the sides of the neck and becomes the sole color of the throat and upper breast.

White, which appears on the face, is seen on the underparts sometimes rimmed with a streak of black, as on the breast and abdomen, sometimes intermixed with it as on the tail and wing coverts. The sides of the body are of a ruddy tinge.

The general color of *Eupetes nigririssus* above, including the tail and wings, is bluish, becoming dark, almost black towards the wing extremities, with bluish margins. On the face, especially about the eye there is much black; a band of the same runs around the neck; bordering the pure white throat. White spots the cheeks, also enclosed by black. The under parts are a slate color, with a bluish cast; this is true as well of the tail and under wing. Length 8 inches. The female is similar though a little smaller. The male lacks the clear stripe of white above the eye, which the female possesses. Habitat, Southeastern New Guinea.

Of the *Drymoedus*, a group allied with the *Eupetes*, a species named *Drymoedus beccarii* is the inhabitant of Southern New Guinea and the neighboring islands. The color of this pretty bird is a warm brown above, the head darker, the wings pale brown and black with white tips. The tail is similarly marked. White and black markings diversify the side face about the eye. The rest of the face and throat are clear white. The under parts are a buff, more or less variable; the crissum a dark brown. As on the wings above, so below the coloration contains bars of white in addition to the dusky brown. The bill is black. The length is about 7 inches.

Another bird of kindred species and not very unlike in plumage is *Orthonyx novæguineæ*. In this case, however, the white on the under surface is far more extended. This hue is intruded upon by brown and black. The white above is less developed.

Pomatorhinus isidorii of the same family does not differ greatly in appearance. It is rather longer than the preceding and of a prevailing brown or russet, shaded more or less. Its length is about 8 inches. The female is like the male, perhaps a trifle larger in size.

A much smaller genus of birds is *Crateroscelis*, represented in New Guinea by two species, *C. murina* and *C. monarcha*. Here the ground color is still brown, brighter on the tail, darker on the head. Even the throat which is white is slightly tinged. So, too, the abdomen and lower parts generally. Total length 4.5 inches. The latter species has more white upon the under body, otherwise is mainly like the preceding.

RECENT LITERATURE.

Murray's Introduction to the Study of Sea-Weeds.¹—In this work from the press of Macmillan & Co., George Murray has given us a book which will be of much service to those beginning the study phycology. The introduction treats briefly of the history of phycology, of the geographical and littoral distribution, and the structure of sea-weeds, and there is appended thereto some valuable information on the collection and preservation of material. Following the introduction there is given a well selected list of eighty books and papers on phycology. The book is illustrated by eight full paged colored plates—four on the red, two on the green and two on the brown sea-weeds—and eighty-eight figures in the text. The figures in the colored plates are somewhat crowded, and the specimens figured are in some cases rather

¹ An Introduction to the Study of Sea-weeds, by George Murray, F. R. S. E., F. L. S., Keeper of the department of Botany, British Museum. With eight colored plates and eighty-eight other illustrations. London, Macmillan & Co., and New York, 1895, 271 pp., 12 mo.